LOOK INSIDE

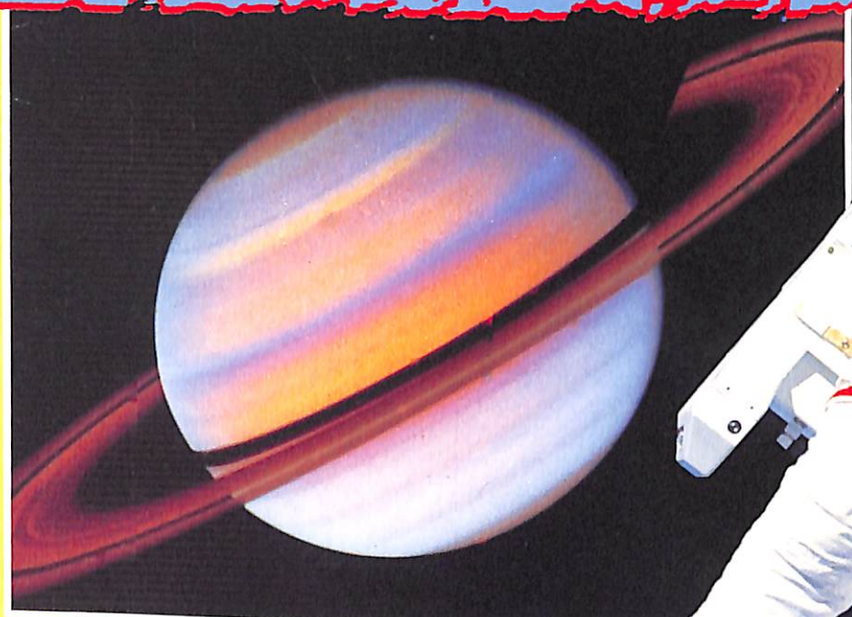
A Marshall Cavendish Collection

EVERY FORTNIGHT

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

MAN IN SPACE 2

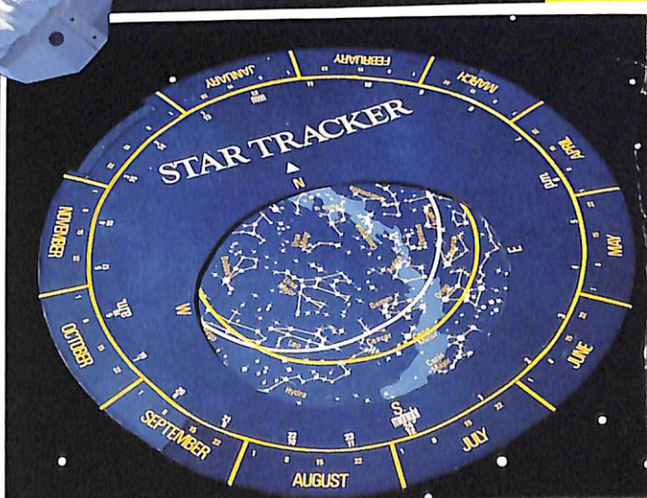


GIANT SHUTTLE POSTER

THREE PROJECTS

FACT FILES:

- The outer planets
- Surviving in space
- Life of a star
- Mars – Man's next base
- Flying the Shuttle
- Star Wars
- Eye in the sky
- Moon shot
- A place in the universe
- Telescopes for tomorrow



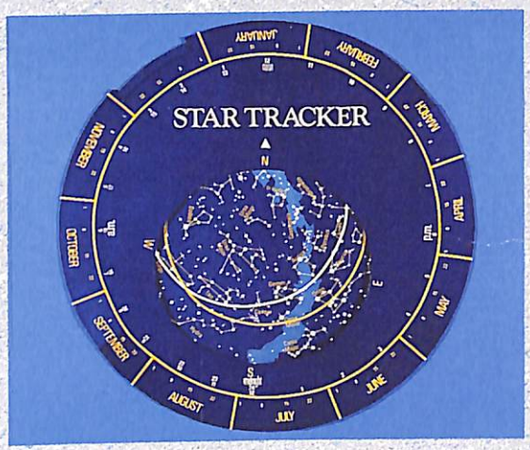
MODEL: STAR TRACKER

UK £1.99 IR£2.25 Aust $4.95 NZ $5.95 Malaysia $7.95 Sing $5.95 Malta Lm1.75 R

INSIDE THIS PACK

FACT FILES

▶Planets ▶Surviving in space ▶Birth of a star ▶ Missions to Mars ▶Space weapons ▶Spy satellites ▶Man on the Moon ▶The galaxies ▶ Telescopes of the future



MODEL Star Tracker

POSTER The Space Shuttle

PROJECT SHEET

- Water rocket
- Model shuttle launch
- Spinning Earth experiment

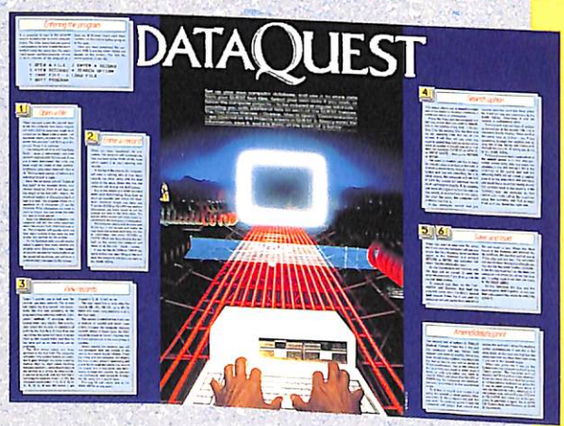
COMING IN QUEST 3 COMMUNICATIONS

FACT FILES include:

▶Discs and videos
▶Animal chat
▶Laser printing
▶Modern-mail
▶In search of ET

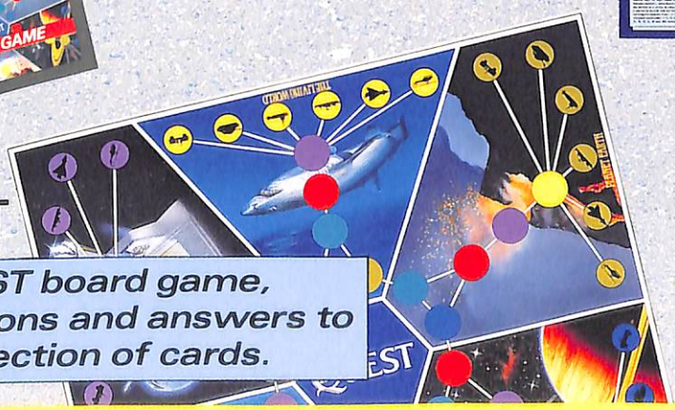
DATAQUEST

Introducing the QUEST database



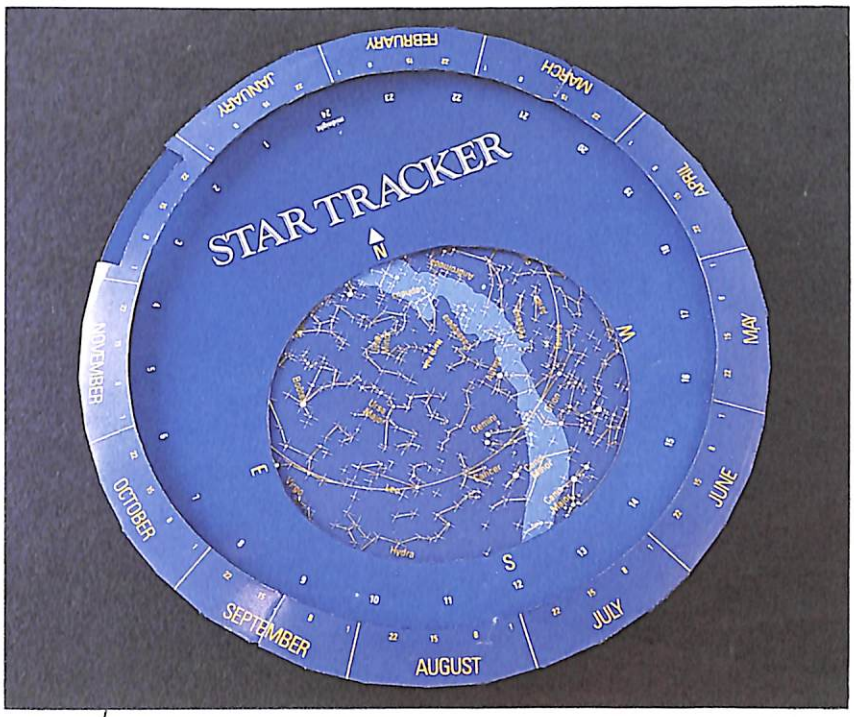
IN-QUEST

FREE! IN-QUEST board game, with 90 questions and answers to start your collection of cards.



MODEL STAR TRACKER

ASSEMBLY INSTRUCTIONS



You will need

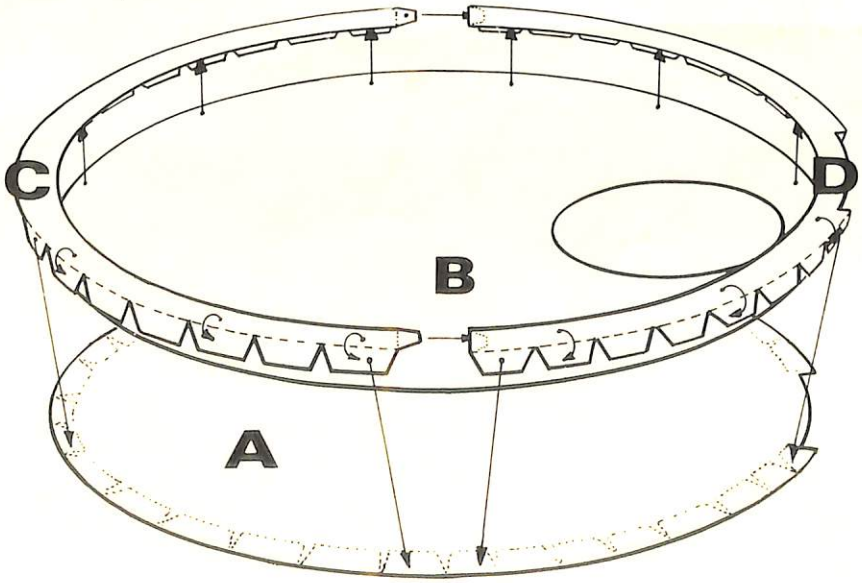
Scissors • Junior craft knife • Glue

Before cutting out the pieces, score along broken lines with a blunt edge to make folding and gluing easier.

To make up

1 Cut out base A.
2 Cut out inner circle B and use a craft knife to cut out the window.
3 Cut out outer rims C and D. Glue tabs at the end of outer rim C to the ends of outer rim D to form a circle. Fold all tabs under.
4 Place outer rim circle face down and fit the inner circle B – also face down – under folded tabs. Press tabs firmly down over inner circle.
5 Apply glue to tabs taking great care to keep the inner circle completely free of glue.
6 Take base A and, aligning the slots, press firmly in position over the top of the glued tabs.
7 Directions for using the Star Tracker are given on the back of the model.

Assembly Instructions



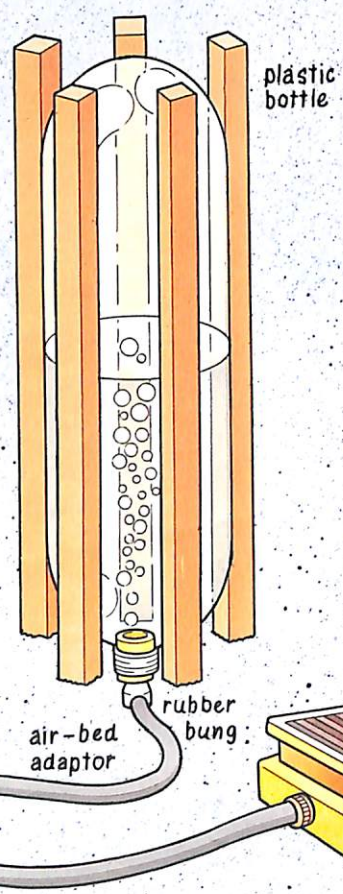
the CONSTELLATIONS

LATIN	ENGLISH
Andromeda	The Chained Maiden
Aquarius	The Water Carrier
Aquila	The Eagle
Aries	The Ram
Auriga	The Charioteer
Boötes	The Bear-Driver
Cancer	The Crab
Canis Major	The Great Dog
Canis Minor	The Lesser Dog
Capricornus	The Goat
Cassiopeia	Cassiopeia
Cepheus	Cepheus
Cetus	The Sea Monster
Cygnus	The Swan
Eridanus	The River
Gemini	The Twins
Hercules	Hercules
Hydra	The Water Snake
Leo	The Lion
Libra	The Scales
Lyra	The Lyre
Ophiuchus	The Snake-holder
Orion	The Great Hunter
Pegasus	The Winged Horse
Perseus	Perseus
Pisces	The Fishes
Pisces Austrinus	The Southern Fish
Sagittarius	The Archer
Scorpius	The Scorpion
Taurus	The Bull
Ursa Major	The Great Bear
Ursa Minor	The Lesser Bear
Virgo	The Maiden

PROJECTS

2 - MAN IN SPACE

- Will a rocket go further if you load it with more fuel?
- How can you make a model space shuttle glide to the ground?
- What is the principle of the sundial?

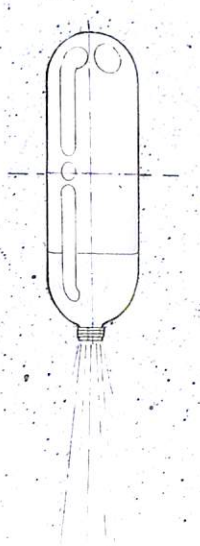


WATER ROCKET

1 2 **3** 4 5

Follow the instructions carefully and carry out under adult supervision.

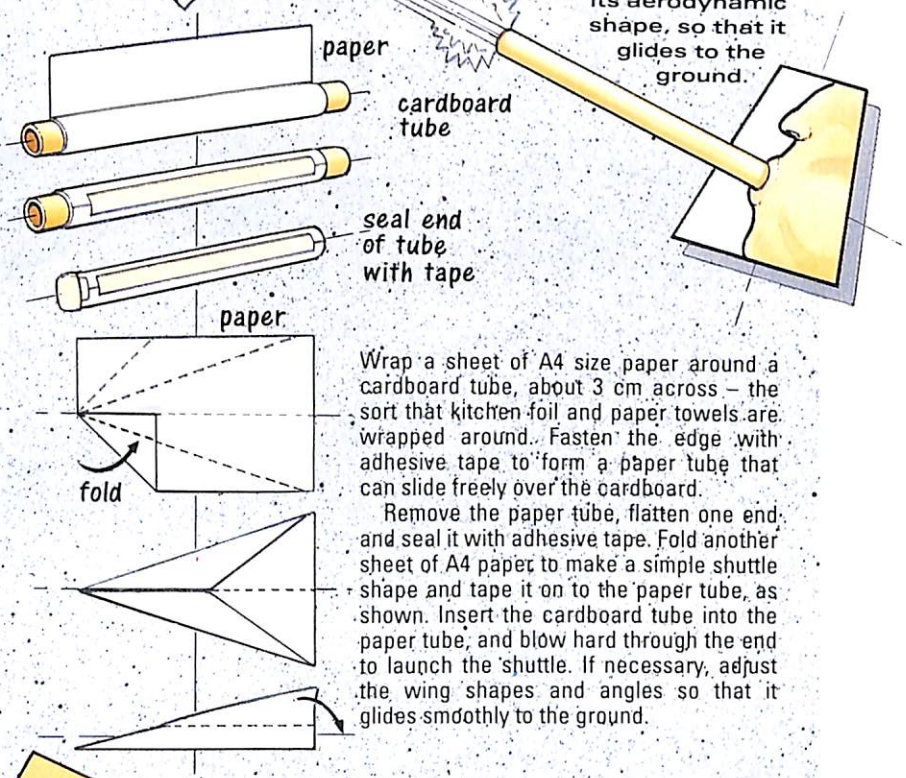
Get an empty 1½ or 2 litre plastic drinks bottle; remove any thick, protective base. Half fill the bottle with water and insert a tight-fitting cork with a hole bored through it. Connect a foot pump to the cork using an adaptor designed for inflating air beds. Go out-doors to a launch site well away from any obstacles or people. Push five sharpened sticks, just taller than the bottle, into the ground in a circle to support the bottle. Place the bottle upside-down in the circle; ensure it is upright and well supported. Stand as far away as possible and pump in air until the pressure blows the bung and forces out the water to give lift-off. See how height varies with different water levels.



MODEL SHUTTLE LAUNCH

1 2 **3** 4 5

Launch a model space shuttle, using a blast of air to provide the thrust. Experiment with its aerodynamic shape, so that it glides to the ground.



Wrap a sheet of A4 size paper around a cardboard tube, about 3 cm across – the sort that kitchen foil and paper towels are wrapped around. Fasten the edge with adhesive tape to form a paper tube that can slide freely over the cardboard.

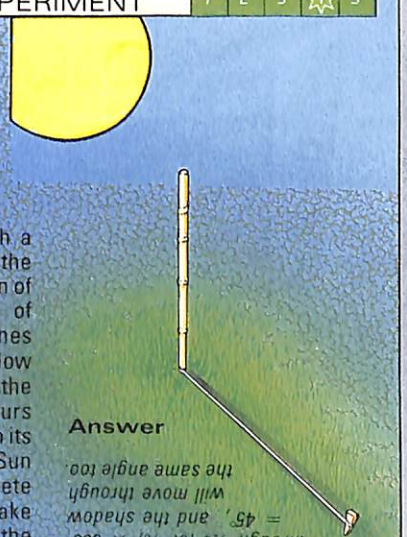
Remove the paper tube, flatten one end and seal it with adhesive tape. Fold another sheet of A4 paper to make a simple shuttle shape and tape it on to the paper tube, as shown. Insert the cardboard tube into the paper tube, and blow hard through the end to launch the shuttle. If necessary, adjust the wing shapes and angles so that it glides smoothly to the ground.

SPINNING EARTH EXPERIMENT

1 2 3 **4** 5

Shadows on the ground slowly move as the Sun passes across the sky. Try calculating where a shadow will fall in a few hours time.

On a clear, sunny day, push a bamboo cane upright into the ground and mark the position of its shadow with a piece of string. Use a peg or two stones to hold the string in place. Now try working out where the string will be in three hours time. **Hint** The Earth spins on its axis in 24 hours, so the Sun appears to move in a complete circle - 360° - in this time. To make a sundial, mark where the shadow will be on each hour.



Answer

In three hours, the Sun will move through ⅛ (or 3/24) × 360° = 45°, and the shadow will move through the same angle too.

PROJECT INFORMATION

1 2 **3** 4 5

*Each **QUEST** project has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.*

WARNING!

Parents should ensure that experiments involving sharp tools, water and electricity are supervised. The publisher can accept no responsibility for injury.

THE SPACE

Commander

Pilot

flight deck

control panels for managing the Shuttle and the payload while in orbit

radiator panels, linked to the cooling system; dissipate the heat which builds up inside the craft

TV camera

cargo bay doors (two each side) kept open to allow the cooling system to operate

RCS main thrusters, used while in space

RCS fuel tanks, comprising monomethyl hydrazine and nitrogen tetroxide

nose cap made from reinforced carbon-carbon (RCC) which will withstand temperatures up to 1,650°C

protective cover for satellite payload

undercarriage nose wheel

vernier engines, part of the Reaction Control System (RCS), used for control of the Shuttle in space

main hatch used to enter and exit the spacecraft

storage compartments for food and equipment

mid deck

toilet or Waste Management System

sleeping area for up to four crew members

airlock module which can be repositioned inside the crew compartment or the cargo bay, and can be linked to the Spacelab system

black tiles for heat resistance, can withstand up to 1,275°C

main undercarriage, used only for the final landing

leading edges of th
with reinforced carbon-
to withstand 1,650°C

QUEST

SHUTTLE

PROFILE

Overall length 37.19 metres

Span 23.79 metres

Overall height 17.27 metres

Unladen weight 68,040 kg

Launch weight 2 million kg

Thrust of main engines 2.1 million newtons (equivalent to the thrust of three Concordes)

Fuel main engines – liquid oxygen and liquid hydrogen
while in space monomethyl hydrazine and nitrogen tetroxide

Speed in orbit 28,160 km/h
on touchdown 335 km/h

Orbital height 1,100 km maximum

Cargo bay length 18 metres

Cargo bay diameter 4.5 metres

Crew up to eight

Mission length 7 days (average)
30 days (maximum)

Relative cost of mission $700 per kg (average aircraft costs are $26 per kg)

Shuttle missions: date of first launch

Enterprise	Testing craft only
Columbia	12 April 1981
*Challenger**	4 April 1983
Discovery	30 August 1984
Atlantis	4 October 1985

*Challenger exploded in mid-flight on 28 January 1986

Remote Manipulator System (RMS), a robot arm for moving payloads in and out of the cargo bay in orbit

TV camera

end effector with finger-like claws for holding payloads

typical payload

Nomex felt, surface insulation on non-leading edges; can withstand 370°C

handholds distributed around the entire rim of the cargo bay

white tiles, can withstand 650°C. On later Shuttles these have been replaced by special fabric insulation

rudder – split in order to act as a brake during the landing approach

propellant for the Reaction Control System, for use while in space

Orbital Maneuvering System (OMS) engines, used to control the orbit

RCS rockets, similar to those in the nose

helium tanks

main engines burning liquid oxygen and liquid hydrogen

body flap protects the engines during re-entry

wing, protected carbon (RCC),

Brian Delf/NASA